

ATTORNEY DOCKET NO. P21-US

REMARKS:

Claims 1-24 and 55-66 are pending; and no claims stand allowed. Claims 71 to 81 are new claims.

An interview between examiner Khanh Duong and applicant's representative Greg Muir was conducted on October 26, 2004, the substance of the interview is incorporated in the following remarks.

During the interview, the Bishop reference, US patent 6,124,650 issued Sep. 26, 2000 was mentioned by the Examiner. Applicant respectfully submits that the Bishop reference neither teaches nor suggests the claimed invention for at least the following reasons.

The Bishop reference discloses a non-volatile MEMS micro-relay using magnetic actuators. The actuation is accomplished with a latchable film (e.g. 14 in FIG. 3). Because of the magnetic actuation nature, the latchable film is a latchable magnetic material, which can be selected from Fe-Ta-N, Fe-Cr-Ta-N, Fe-Zr-N, Co-Fe, Ni-Fe, FeCr-Co, and other Fe, Co, or Ni based ferromagnetic films. In contrast, the MEMS device of the claimed invention is directed to a MEMS device actuated by electrostatic force derived from an electrostatic field. Accordingly, the independent claims 1, 24, 55, and 64 each have been amended to expressly recite such feature (e.g. "wherein the movable portion is operable to be actuated by an electrostatic force derived from an electrostatic field established between the movable portion and an electrode.") According to claims 1, 24, 55, and 64, the device is electrostatically actuated. And for the purposes of providing robust and reliable mechanical and electrical properties, the MEMS device of the claimed invention uses a nitride compound and a late transition metal (claim 1), a ceramic compound and a late transition metal (claim 24), a late transition metal and an element selected from groups 3A to 6A of the periodic table (claim 55), and a ceramic compound and a late transition metal of ternary or higher system (claim 64). Because the claimed invention and the Bishop reference are patentably distinct, the independent claims 1, 24, 55, and 64, as well as the claims dependent therefrom, are patentable over the Bishop reference.

New independent claim 71 is similar to claim 1, except that claim 71 (instead of reciting a movable portion and electrostatic actuation) expressly recites that the flexible hinge comprises a nitride compound and a late transition metal, wherein the nitride compound and late transition metal are in the same layer and wherein the film or layer is a ternary or higher system deposited by chemical or physical vapor deposition.

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New independent claim 73 is similar to claim 24, except that claim 73 (instead of reciting electrostatic actuation) expressly recites that it is the flexible hinge that comprises a ceramic compound and a late transition metal, wherein the ceramic compound and late transition metal are in the same film or layer and wherein the film or layer is a ternary or higher system deposited by chemical or physical vapor deposition.

New independent claim 75 is similar to claim 55, except that claim 75 (instead of reciting electrostatic actuation) expressly recites that the flexible hinge comprises a late transition metal and an element from groups 3A to 6A of the periodic table and with the flexible hinge being formed by chemical or physical vapor deposition, wherein the late transition metal and the element from groups 3A to 6A of the periodic table are in the same film or layer and wherein the film or layer is a ternary or higher system deposited by chemical or physical vapor deposition.

New independent claim 77 is similar to claim 64, except that claim 77 (instead of reciting electrostatic actuation) expressly recites that it is the flexible hinge that comprises a ceramic compound and a late transition metal, wherein the ceramic compound and late transition metal are a ternary or higher system within a common layer.

The combination of features as recited in these independent claims, 71, 73, 75, and 77 are neither disclosed nor suggested by the Bishop reference. In the Bishop reference any mention of the use of a late transition metal is in a plate portion (e.g. magnetic material 14 in FIG. 4) of the device (for allowing magnetic actuation), but not in the hinge portion of the device in Bishop. There is no suggestion in Bishop that the materials comprising late transition metal would make good hinge materials, nor would there be a motivation to make such a modification because the purpose of the ferromagnetic materials in Bishop is to facilitate magnetic actuation. In contrast, the movable portion (e.g. movable portion 47 in FIGs. 2F and 2G) of the device in the present application is connected to the flexible hinge (e.g. flexible hinge 46 in FIGs. 2F and 2G), and the movable portion may be thicker and stiffer than the hinge, for example, as shown in FIGs. 1G to 1J in the present application, and it is the flexible hinge portion that comprises the late transition metal in claims 71, 73, 75, and 77. Therefore, it is respectfully submitted that independent claims 71, 73, 75, and 77 are patentable over Bishop. For the same reason, independent claim 79 is also patentable over Bishop.

In the Office Action mailed June 25, 2004, claims 1-24 and 55-66 were rejected under 35 U.S.C. 103(a) as being unpatentable over Linder et al. ("Ternary Ta-Si-N Films for Sensors and

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Actuators" Sensors and Actuators, Vol. A61 (1997), pp. 387-391) in view of Oyama et al. (US 5,444,173).

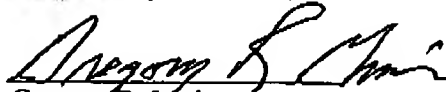
In the Office Action, the Examiner took the position that the use of early transition metals in MEMS as disclosed in Linder made obvious the use of late transition metals, due to the equivalency of early and late transition metals. The Examiner relied on Oyama for supporting the position that early and late transition metals are equivalent. It is hoped that the Examiner will reconsider this position in view of the following.

First, the Oyama reference did not state that early and late transition metals were equivalent. Oyama simply used some early and late transition metals for the same purpose in that reference. But making the leap from the use of some early and late transition metals in Oyama, to making a prima facie case of obviousness that early and late transition metals are interchangeable in other areas, is not valid. In fact, it is submitted that it is not even valid for the field of Oyama.

A Declaration under 35 U.S.C. §1.132 was submitted with the Response to Office Action mailed October 22, 2004 to support the above statements that early and late transition metals are not interchangeable whether in all fields, or for the claimed invention. It is hoped that the Examiner will consider the statements above and in the declaration, and reconsider the continued rejection of the claims. This declaration is also being filed in co-pending applications serial number 10/176,478 filed on June 21, 2002 and 10/198,389 to filed July 17, 2002 both to Reid, where the same issue relating the early and late transition metals is also present.

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. In the event any fees are required in connection with this paper, please charge our Deposit Account No. 501516.

Respectfully submitted,



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